



## Background

Not only low-income countries but also many other nations continue to strive for healthcare systems that provide high-quality, reliable, and affordable healthcare services and medications for all [1]. In 2009, China launched a reform aimed at delivering quality basic healthcare services. The reform achieved notable milestones, marked by a substantial increase in government investment in healthcare. The government has worked to enhance insurance coverage, achieving a stable enrollment rate of 95% after the achievement of universal health insurance in 2011 [2]. Concurrently, funding has been directed toward grassroots healthcare, strengthening the support of personnel, finances, resources, and information for primary healthcare services [3]. However, the system still reveals inefficiencies on the supply side, necessitating the establishment of a comprehensive framework for healthcare services system and a systematic, integrated operational mechanism that prioritizes people-centered care [4].

The people-centered integrated care model (hereinafter referred to as the “integrated care model”) has been widely advocated both domestically and internationally, with pilot initiatives in China aligning with this approach. In 2015, the State Council issued the “Guiding Opinions on Promoting the Construction of a Tiered Health Care Delivery System,” laying a solid foundation for integrated care [5]. The World Bank’s report *Deepening Health Reform in China* (2016) also provided guidance for the development of integrated care in China [6]. Developing primary healthcare is the foremost task in building integrated care system, particularly in developing countries where primary healthcare remains relatively weak. A cost-effective integrated care model requires enhancing primary healthcare and shifting appropriate services from hospitals to primary or outpatient settings. Only by enhancing primary healthcare and transferring certain services from hospitals to grassroots or outpatient settings can a cost-effective integrated care model be realized [6]. Furthermore, given the increasing burden of chronic diseases, a cost-effective care model is necessary, requiring coordinated collaboration across different levels of providers for acute care and post-acute rehabilitation [7, 8]. Primary healthcare facilities not only serve as essential parts of integrated care system but also play a leading role in chronic disease management.

Currently, relevant practical experiences related to integrated care models are concentrated in more developed nations [9–11]. For instance, Clinical Commissioning Groups (CCGs) in the United Kingdom have been granted commissioning authority over primary healthcare and have adopted capitation as the core payment mechanism, promoting integrated care model that

fosters collaboration among regional healthcare physicians [12, 13]. In Ontario, Canada, capitation-based blended payment scheme has facilitated the implementation of Family Health Teams (FHTs) [14]. In the United States, capitation has been introduced as part of efforts to address the misalignment between fee-for-service (FFS) incentives and the goals of coordination and prevention in the Patient-Centered Medical Home (PCMH) model [15]. China has attempted to establish localized integrated care networks, primarily composed of county or district hospitals and primary facilities, to provide continuous, high-quality healthcare services to residents within counties or regions together, thereby reducing the demand for cross-regional healthcare utilization. However, as previously mentioned, the inefficiency in service delivery stems largely from an inadequate incentive mechanism for physicians (e.g., previous FFS payment model, mark-ups on medication prices), which results in unreasonable healthcare service behavior that directly leads to decreased delivery efficiency [6]. Therefore, it is essential to devote efforts to designing a financial incentive mechanism that coordinates multiple stakeholder profiles and enhances the overall performance of integrated care system [6, 16]. Additionally, the limited out-





**Table 1** Characteristics of outpatient visits with T2DM from 2014 to 2019

T2DM

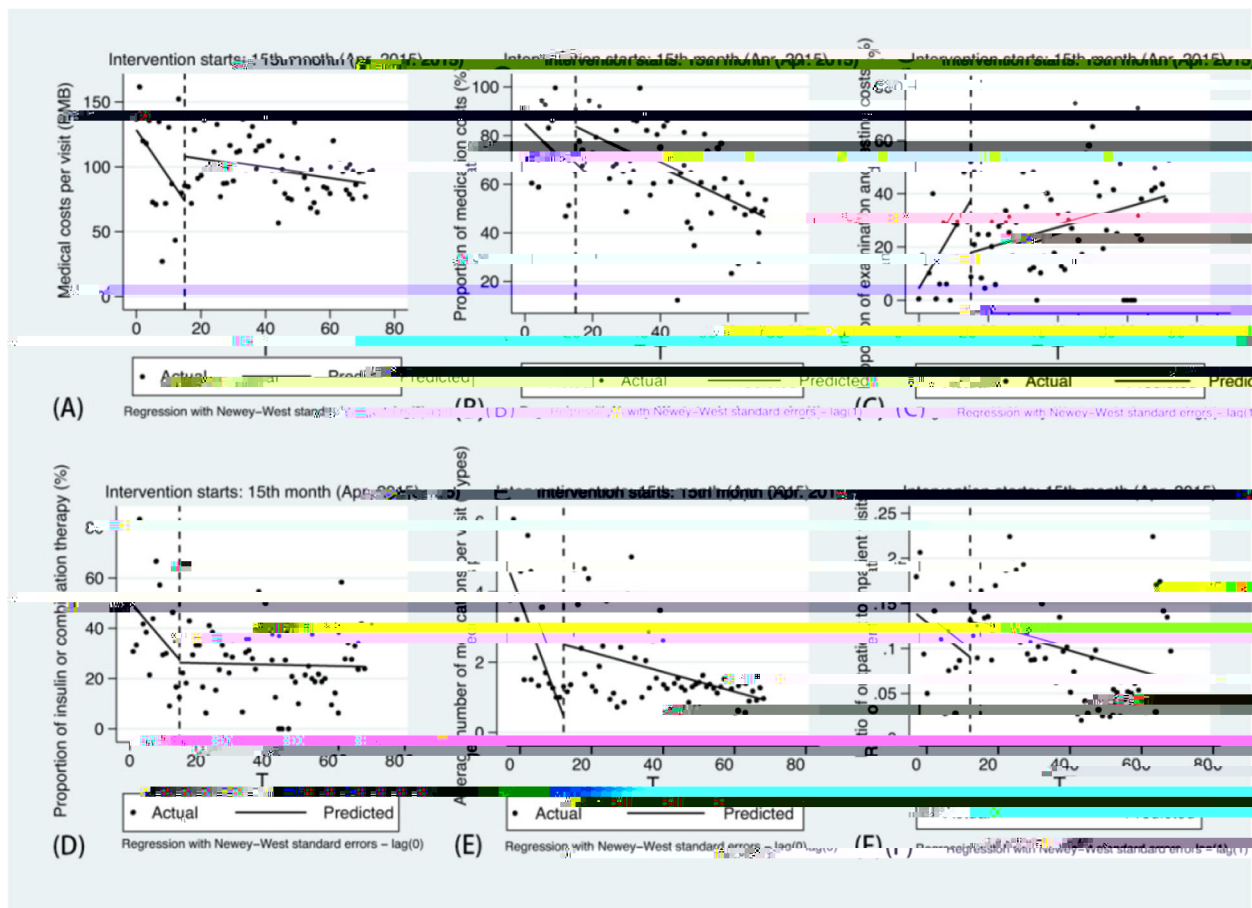


Before the reform, the proportion of medication costs showed a declining trend (−1.355, 95% CI: −3.125 to 0.414). After the reform, the instantaneous level of medication costs increased by 19.115% (95% CI: 0.158 to 38.071,  $p < 0.05$ ), but the change in trend was not significant (0.691, 95% CI: −1.09 to 2.472).

Before the reform, the proportion of examination and







**Fig. 2** Interrupted time series analysis of healthcare service behavior in county hospitals, 2014-2019. Note: **A** Medical costs per visit (RMB), **B** Proportion of medication costs (%), **C** Proportion of examination and testing costs (%), **D** Proportion of insulin or combination therapy(%), **E** Average number of medications per visit (Types), **F** Ratio of outpatient to inpatient visits. Dots are the average or ratio of the observed monthly indicators, and solid line is the predicted value of the monthly indicators derived from the ordinary least squares regression with Newey-West standard errors. Baseline: from January 2014 to March 2015; Intervention stage: from April 2015 to December 2019. Across all models, rare monthly points fell outside the 95% prediction interval

In F County’s integrated care system reform, in addition to the core capitation payment model, basic public health funding was also allocated to the medical communities on a per capita approach. County hospitals received funding based on both the quantity and quality of public health services delivered—measured by indicators such as hospitalization rates and patient satisfaction, which reflect both clinical service and public health performance. This well-designed mechanism incentivized primary healthcare providers to strengthen chronic disease management and reduce hospitalization needs caused by complications, thereby promoting a shift toward proactive health management.

These results regarding the cost structure reveal that medication costs constitute the largest share of total costs, closely aligning with findings from another rural study conducted in 2015 [29]. Analyzing the trend

of changes in the cost structure reveals that after the reform, there was a slight increase in the proportion of medication costs in primary healthcare facilities, while examination and testing costs decreased; conversely, the trend in county hospitals was the opposite. This indicates a more pronounced trend in primary healthcare facilities toward prescribing medications for the management and control of common illnesses, while county hospitals primarily focus on specialized examinations, complication assessments, and treatment planning for critically ill patients with T2DM [20].

Enhanced standardization of physicians’ prescribing practices and control of medical cost growth We conducted a focused analysis on physicians’ medication practices for T2DM patients, as pharmacological treatment is essential alongside lifestyle management



intensity of medication use and strengthened chronic disease management.

This study provides empirical support for the effectiveness of capitation payment model, showing favorable performance in terms of financial sustainability, the division of responsibilities between different levels of healthcare facilities, and the standardization of care. Notably, the unified budgeting arrangement for outpatient and inpatient services appears to have effectively mitigated cost-shifting behaviors. However, the limited service capacity of primary healthcare facilities in this county underscores the importance of strengthening primary healthcare to improve the efficiency of regional service delivery. From a policy perspective, future reforms should promote the evolution of primary healthcare capitation payment models toward accountability for total cost of care and higher-quality, value-based payment model [41].

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-025-22979-8>.

Supplementary Material 1

### Authors' contributions

JZ, YX and NZ conceived and designed the study. YS pre-processed and interpreted the data. JZ, JY and XL analyzed the data. JZ, YX and NZ wrote the manuscript. All authors reviewed the manuscript.

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### Data availability

As the database used in our research group is confidential and we have signed a non-disclosure agreement, we regret that we cannot publicly share the original data. However, the dataset analyzed in this study is available from the corresponding author on reasonable request.

### Declarations

#### Ethics approval and consent to participate

We confirm that all procedures were conducted adherence to the Declaration of Helsinki. Informed consent was obtained from all participants and/or their legal guardians. This study was approved by the Medical Ethics Committee of Capital Medical University.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare no competing interests.

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